

## PATENT ABSTRACTS OF JAPAN

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(71)Applicant : RICOH CO LTD

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(72)Inventor : MORI KOJI  
MIYAZAKI YASUMITSU

## (54) OPTICAL WAVELENGTH CONVERSION ELEMENT

## (57)Abstract:

**PURPOSE:** To provide the second harmonic wave generating element having high conversion efficiency and high reliability by forming this element into the two-layered structure laminated and formed with a thin film-like waveguide layer on a single crystal substrate of  $\text{LiTa}_{1-x}\text{Nb}_x\text{O}_3$  and setting specific conditions between the ordinary light refractive indices at the frequency  $\omega$  of respective input light rays and the extraordinary light refractive indices at the frequency  $2\omega$  of respective exit light rays.

**CONSTITUTION:** This element is made into the two-layered structure laminated and formed with thin film-like waveguide layer on the single crystal substrate of the  $\text{LiTa}_{1-x}\text{Nb}_x\text{O}_3$  (where  $0 \leq x \leq 1$ ) 2 and is so formed as to satisfy the conditions expressed by equation I where the ordinary light refractive indices at the frequency  $\omega$  of the respective input light rays are designated as  $n_{0\omega}$  (substrate),  $n_{0\omega}$  (waveguide layer) and the extraordinary light refractive indices at the frequency  $2\omega$  of the respective exit light rays as  $n_{e2\omega}$  (substrate),  $n_{e2\omega}$  (waveguide layer). Then, the phase matching conditions for the generation of second harmonic wave generation are eventually satisfied. The second harmonic wave generating element which can be easily produced, has high conversion efficiency and has the high reliability strong to a fluctuation in temp., etc., is obtd. in this way.

$n_0^2(\omega) \cdot n_e^2(2\omega) < n_0^2(\omega) \cdot n_e^2(2\omega) \leq n_e^2(\omega) \cdot n_0^2(2\omega)$

